DOCUMENT RESUME

ED 179 976 CS 205 326

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TITLE Teacher Grammar and Pupil Achievement in Mathematics.
PUB DATE Oct 79
NOTE 13p.: Paper presented at the Annual Meeting of the Northeastern Educational Research Association (Ellenville, NY, October 24-26, 1979)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement: Communication Skills: Educational Research: *Effective Teaching: Elementary Education: Grade 4: *Grammar: *Language Usage: *Mathematics Instruction: Student Teacher Relationship: *Teacher Behavior: Teachers: Teaching Skills

ABSTRACT

A total of 102 fourth grade students were assigned to one of six groups defined by the possible combinations of two pupil ability level conditions (above versus below average ability) and three teacher verbal fluency conditions (good grammar, moderately good grammar, poor grammar). Each group was presented a lesson concerning mathematical concepts. After the lesson, each group was tested for comprehension of the concepts. The good grammar groups achieved significantly higher scores than the moderate grammar groups, but their scores were not significantly higher than the poor grammar groups. It was suggested that the absence of a linear progression might have been caused by the attending behaviors of the students. (Author/RL)

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Teacher Grammar and Pupil Achievement in Mathematics

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Teacher Grammar

CS205 326

Teacher Grammar and Pupil Achievement in Mathematics

Among the behaviors involved in the act of teaching, the verbal behaviors typically predominate. Jackson(1966) estimated that approximately 1000 interactions occur daily between elementary teachers and students. A substantial proportion of teacher talk deals with substantive meaning. Ineffectual communication due to poor verbal facility and its relationship to student achievement is the primary purpose of this study.

Rosenshine(1971) reviewed research that indicated that teacher verbal clarity influences student achievement. However, the studies involved high inference indicators of clarity, in which relatively subjective judgments were used to determine degrees of clarity. Clarity was not defined operationally and therefore did not represent specific, quantifiable behaviors.

Hiller, Fisher and Kaess(1969) conducted one of the first studies using a low inference variable of clarity. Hiller et al. investigated vagueness terms and found that a teacher's use of these terms negatively influenced achievement.

Another study which focused on observable, measurable behaviors of teacher clarity was conducted by Land and Smith(1979). They found that mazes, defined as false starts, halts in speech, and redundant phrases, negatively influenced achievement.

The present study investigated a low inference indicator of

teacher clarity that involves the syntactic structure of the teacher's verbal patterns. The purpose of the study was to determine the joint effects of different degrees of teacher verbal fluency(as measured by appropriateness of teacher grammar) and pupil ability on the learning of mathematical concepts and processes.

Method

Subjects. The 102 students were enrolled in fourth grade classes in the Richmond County(Georgia) public schools. The students participated by virtue of their teachers expressing willingness to be involved. Approximately 60% of the students were Black and 40% were of Caucasian ancestry. Approximately 50% of the sample was female. All 102 students had been administered the Comprehensive Tests of Basic Skills(CTBS) earlier in the school year. The mean CTBS grade equivalent score for the sample was 3.35. Students then were divided into two groups, those who scored above the mean on the CTBS and those who scored below the mean. The 51 students who scored above the mean were placed in groups of three in such a way that the difference between any two of the three CTBS scores did not exceed 0.2 points. Each student in each group of three was randomly assigned to one of three groups(n=17 each) defined by three verbal fluency conditions (good grammar, moderate grammar, poor grammar). The 51 students who scored below the CTBS mean were randomly assigned to groups in the same way as described for those who scored above the mean. Thus, six groups were formed by the possible combinations of

verbal fluency conditions and ability levels.

Procedure- Each of the six groups was presented a 17-minute audiotaped lesson with accompanying examples displayed on an overhead projector. The lesson involved using formulas to compute areas of rectangles and right triangles. None of the students had been presented this content in prior classroom sessions, as confirmed by each classroom teacher.

Each lesson was audiotaped by the same person to ensure that the organization, substantive content, and sequencing of examples was the same. The overhead projector was used to demonstrate appropriate examples during each lesson. The same person displayed the overhead projections during the lessons. Such a procedure is necessary to control many of the extraneous variables that may have been present if the presentations had been "live". The only variation in the lessons was the degree of teacher verbal fluency. Student comprehension of the lessons was determined by administering a 27-item test immediately after each lesson was completed.

The moderate grammar and poor grammar lessons contained redundant phrases, misplaced clauses, double negatives, and other forms of grammatical errors. The poor grammar lesson contained 319 grammatical errors, the moderate grammar lesson contained 159 grammatical errors, and the good grammar lesson contained no grammatical errors. Table 1 shows the types of errors and their frequency of occurrence in the moderate and poor grammar lessons. The following paragraphs represent excerpts from the good grammar, moderate grammar, and poor grammar lessons respectively. The grammatical errors are italicized.

Good grammar: "Let's try some other examples. In Figure A we multiply 4 inches by 5 inches, just as we would when we find the area of a rectangle. But then when we get the answer of 20 square inches we must remember to divide by 2."

Moderate Grammar:"Let's us tries some other examples. In Figure A we multiply 4 inches times 5 inches, just as we would when we find the area of a rectangle. But when we gets then the answer of 20 square inches we must remember to divide by 2."

Poor Grammar: "Let's us tries some other examples. In Figure A we multiplies 4 inches time 5 inches, just as what we be doing to finds the area of a rectangle. But when we gets then the answer of 20 square inches we must remember by 2 to divide.

Insert Table 1 about here

Results

A 2(above average ability vs. below average ability) x 3(good grammar vs. moderate grammar vs. poor grammar) analysis of variance was performed on the student achievement scores. The mean achievement scores for the six experimental conditions are presented in Table 2. Table 3 indicates that the verbal fluency main effect was significant, $F(2, 96)=3.72$, $p < .05$, as was the ability level main effect, $F(1, 96)=60.77$, $p < .001$. There was no significant interaction between ability level and verbal fluency. The Tukey(a) tests revealed a significant difference($p < .05$) between the good grammar groups and the moderate grammar groups.

No significant differences were found between the good grammar groups and the poor grammar groups or between the moderate grammar groups and the poor grammar groups.

Insert Table 2 about here.

Insert Table 3 about here.

Discussion

As expected, the above average students achieved significantly higher than the below average students. What was not expected is that the good grammar groups achieved significantly higher than the moderate grammar groups, but not significantly higher than the poor grammar groups. The absence of a linear progression, though, may point out the attending behaviors of the students.

The students presented the poor grammar lesson may have immediately dismissed the audio portion of the lesson as being too extreme or unrealistic and concentrated more on the overhead projections. They may have attended to the visual aids more closely when they perceived the speaker as being incomprehensible. The students presented the moderate grammar lesson attended to both the audio portion and the visual aids and may have become confused by the lesson presentation, thinking that they comprehended the material when in reality they had not. These findings

are supported by Shapiro(1979) who found similar results when children were presented with varying clarity levels of teacher directives. Children attended to unclear directives with more comprehension than to moderately clear directives.

It must be noted here that no attempts were made to validate the moderate and poor grammar lessons as approximating any dialectic form. Interpretations should not go beyond the fact that these lessons contained grammatical errors that may be found in any nonstandard English speaking group.

The study also suggests that visual materials alone may not induce student achievement if the teacher uses a particular frequency of grammatical errors. Lesson presentation containing grammatical errors may significantly reduce the achievement level of students, despite the inclusion of visual materials and despite the degree to which the teacher has organized and prepared the lesson.

Perhaps a relevant suggestion for supervisors is that, while obvious and exceedingly frequent use of grammatical errors by a teacher warrants immediate remedial work, it is also important for the supervisors not to overlook those teachers who use a moderate or infrequent amount of grammatical errors. Educators should stress the highest quality of verbal fluency at all times.

Further study of this verbal fluency variable should be conducted in which no visual aids accompany lessons. Also there is a need for research investigating the combined effects of verbal fluency and other low inference indicators of teacher clarity (such as vagueness terms and mazes) on student achievement.

Perhaps the single most relevant suggestion for teacher training and teacher evaluation is that low inference indicators of teacher effectiveness be identified and that training and evaluation focus on these particualr indicators.

References

Hiller, J.H., Fisher, G.A. and Kaess, W.A. A computer investigation of verbal characteristics of effective classroom lecturing. American Educational Research Journal, 1969, 4, 661-675.

Jackson, P. The way teaching is. In The Way Teaching Is: Report of the Seminar on Teaching . Washington, D.C.: Association for Supervision and Curriculum Development and the Center for the Study of Instruction of the NEA, 1966.

Land, M.L. and Smith, L.R. The effect of low inference teacher clarity inhibitors on student achievement. Journal of Teacher Education, 1979, 30.

Rosenshine, B. Teaching behaviours and student achievement. London: National Foundation for Educational Research in England and Wales, 1971.

Shapiro, E.R. Teacher directive clarity and subsequent child responses: individual differences within teachers, classes and times. Paper presented at the annual NERA conference, New York, 1979.

Table 1

Grammatical Errors and the Frequency of Occurrence

	Occurrences in Poor Grammar Lessons	Occurrences in Moderate Grammar Lessons
Redundant phrases(let's us, this here)	17	8
Substitute "what" for "that"	16	8
Substitute "them" for "these"	3	2
Verb substitution(e.g., "is" for "are")	30	15
Adding "s" to verb	94	45
Deleting "s" from verb	22	11
Double negative	4	2
Misplaced clauses	45	23
Improper form of "be"	55	27
"'Cause" for "because"	5	3
Adding "s" to noun	9	5
Past tense of verb for present	2	1
Improper use of "done"	11	5
"A" for "an"	1	1
"Ain't"	1	1
"Us" for "ourselves"	2	1
"You" for "your"	2	1
Total	319	159

Table 2

Group Mean Scores

	Good Grammar	Moderate Grammar	Poor Grammar
Above Average Ability	N=17 $\bar{x}$=18.18	N=17 $\bar{x}$=15.41	N=17 $\bar{x}$=17.47
Below Average Ability	N=17 $\bar{x}$=12.29	N=17 $\bar{x}$=10.08	N=17 $\bar{x}$=11.06

Table 3

Results of the Analysis

Factor	df	SS	MS	F
Grammatical Errors(A)	2	108.02	54.01	3.72*
Pupil Ability Level(B)	1	882.353	882.353	60.77**
A X B	2	4.764	2.382	.164
Error	96	1394.236	14.52	

*p <.05

**p <.001